Kerry A. Browder. Use, Needs and Barriers to Use of Information and Library Services by International Agency Staff. A Master's Paper for the M.S. in L.S. degree. April, 2013. 75 pages. Advisor: Cliff Missen

Libraries serve an increasing number of remote users. Within academic and special libraries, remote users comprise geographically dispersed users, including users in low- and middle-income countries. The libraries that serve users in low- and middle-income countries may insufficiently understand the needs of and barriers to library use among remote users in those areas. This paper reports the results of a study done to examine the extent of and barriers to use of library services among international staff at an international non-profit. The study first sought to determine the differences in usage levels of library resources among international staff and U.S.-based staff and then to identify the information needs and barriers to use of library resources and services among international staff. The results presented here indicate that lack of library and bibliographic instruction contribute to lower usage levels and that infrastructure in low- and middle-income countries may further inhibit library use.

Headings:

Information resources -- use studies.

Technology -- information services -- use studies.

Information needs.

Needs assessment.

USE, NEEDS AND BARRIERS TO USE OF INFORMATION AND LIBRARY SERVICES BY INTERNATIONAL AGENCY STAFF

by
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INTRODUCTION

Digital libraries have the potential to equalize access to information, providing resources and services to those in under-resourced areas, including users in low- and middle-income countries. However, it appears that remote users in geographically remote, under-resourced areas such as low- and middle-income countries utilize digital libraries less than someone in local or high-income areas. Libraries serving users in under-resourced areas may not be adequately monitoring the differential levels of use between local and remote users and lack an understanding of the reasons for lower levels of use among remote users, including the ways in which socioeconomic factors affect access and use. Understanding the reasons behind lower usage levels of digital libraries among those in under-resourced areas is a prerequisite for going beyond a theoretical equalization of access to structuring and providing digital resources and services in a manner that will actually equalize access to information.

This paper looks at the usage levels, needs, and barriers to use of a specific special library's services and resources among international users in low- and middle-income countries and investigates other attempts to provide library services to underserved areas to see if there are generalizable conclusions. The primary method of study was a survey distributed to international staff at Ipas, an international non-profit organization headquartered in Chapel Hill, North Carolina. Additionally, the study examined differences in usage of library services among Chapel Hill-based staff and international staff, as determined through retrospective usage statistics collected by the

Library. It is hoped that the research will inform other libraries serving international users, particularly users in low- and middle-income countries.

BACKGROUND AND SETTING

DIGITAL LIBRARIES AND REMOTE USERS

Digital libraries "provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities" (Digital Library Federation, 1998). The community or communities that digital libraries serve has/have become more dispersed as the geographic distance of users has increased to include a globally dispersed population. While some academic libraries serving distance education students have examined usage differences among local and remote users, very little research has been done on the differences in use of digital libraries among those in high-income countries and those in low- and middle-income countries.

Information-seeking behavior and digital information use through the Internet between those in high-income and low- and middle-income areas has been examined in literature outside library science, particularly in studies on and discussions about the digital divide, conceptualized as "the divide between those with access to new technologies and those without" (NTIA, 1999). Research has largely focused on the availability of information and communication technologies (ICTs) to information seekers as the cause of differential access to and use of digital information resources and services. “Low ICT diffusion and adoption . . . [conceptualizes] access as only physical access” to digital information resources and services, a conceptualization that has ignored

other, non-equipment-based barriers to use (Hawkins, 2005, p. 174) that also affect access to web resources and digital library resources and services.

In order to address differential usage levels of library resources and services between local and remote populations, there are several concerns: 1) to what extent do libraries understand the characteristics, behaviors, and information needs of the remote users they serve?; 2) do libraries differentiate between under-use and non-use among remote patrons, since under-use and non-use may have different indications about service and resource delivery?; and 3) are libraries taking into account socioeconomic factors that may account for lower levels of use among remote users? Libraries serving remote populations in low- and middle-income countries face particular challenges in understanding and providing equal access to digital resources and services. Infrastructural and socioeconomic factors have an affect on lower use among users in those areas. The reliability of electricity and Internet connectivity and the [often concomitant] lack of familiarity with information and communication technologies (ICTs) are potential, common contributors to under- and non-use of library resources and services among these remote users.

DIGITAL RESOURCES AND THE IPAS LIBRARY

Ipas is an international non-profit organization that works to advance women's sexual and reproductive health and rights around the world, particularly in low-resource settings. The organization includes a special library, the Ipas Library, which serves to support the work of its staff by making relevant resources and services available to them. The Ipas Library has increasingly focused on digital resources and services as a means of increasing and improving accessibility of resources and services for international staff as

well as remote users in the United States. Despite the increasingly digital scope of the Ipas Library's collections and services, statistics indicate that under-use and non-use of library resources and services by international staff is prevalent. As the library's emphasis on digital resources and services increase, under- and non-use of the library becomes a greater concern.

Making digital resources and services available across boundaries has the potential to eliminate geographical barriers to use, but geographical barriers [sic, distance] to use of libraries does not always take into account other barriers to use, particularly for users in low- and middle income countries. The availability, accessibility and usage of information resources and services are critical for libraries serving these populations, since information is a critical component of development efforts.

LIBRARIES AND THE MILLENNIUM DEVELOPMENT GOALS

The World Health Organization's (WHO) Millennium Development Goals, developed throughout the 1990s, were finally adopted in 2000, with the goals of concretizing "the efforts that must be undertaken by developing countries, and the contribution that developed countries can make through trade, development assistance, debt relief, access to essential medicines and technology transfer" (Hawkins, 2005). Information professionals have a central role in the achievement of the eight Millennium Development Goals—particularly those related to health and health policy through the provision of relevant information resources, guaranteeing secure environments for those seeking information, aiding in the attainment of education, and engaging in public outreach to make communities aware of the existence of information resources and services (Forsyth, 2005).

Libraries and librarians cannot singly accomplish the eight Millennium Development Goals, but must be considered as part of an integral "system that requires cooperation among a wide range of professionals including health-care providers, policy makers, researchers, publishers, information professionals, indexers and systematic reviewers" (Godlee, Pakenham-Walsh, Ncayiyana, Cohen, & Packer, 2004, p. 295). Considered alone, the contribution of libraries to the attainment of MDGs can be difficult to quantify (Lor, 2008, p. 31), but in working in conjunction with other professionals and organizations, libraries can acquire and provide access to the information that facilitates the accomplishment of these goals. The tasks and requirements involved in information provision to achieve the Millennium Development Goals include "financial and material resources, a manipulation and combination of existing knowledge, its component parts, information and data, the production of new knowledge and skilled human resources to facilitate the use of this knowledge [that] are critical to achieving the MDGs (Kaniki, 2008, p. 16).

IPAS'S WORK IN THE CONTEXT OF THE MILLENNIUM DEVELOPMENT GOALS

The Ipas Library is part of a larger organization that is directly engaged in the achievement of the Millennium Development Goals. Ipas is an international non-profit, founded in 1973 [originally known as International Pregnancy Advisory Services], funded by domestic and international donors. The organization is engaged in promoting and improving women's sexual and reproductive health and rights. As such, the work of the organization directly supports Millennium Development Goal 5: improving maternal health through efforts to reduce maternal mortality rates and providing safe, reliable, and universally accessible reproductive health services (World Health Organization, 2007).

Goal 5 has a special importance because "sexual and reproductive health is a prerequisite of all goals, particularly those related to gender and health" (World Health Organization, 2012).

The contribution of Ipas is described in the organization's mission statement:

> Ipas works with health-care systems and providers to increase their skills and capacity to deliver safe abortion services. We work with nations' ministries of health to interpret laws governing abortion in the broadest terms possible and to write standards and guidelines for abortion care accordingly to ensure access for as many women as possible. We educate health-care providers and administrators about the importance of providing safe abortion services as a matter of public health and human rights. And we work to bolster the number of available abortion providers by advocating for laws and policies that allow non-physician providers to perform abortion services and referrals; we also work to train these non-physician provider groups, such as certified nurse midwives and community health volunteers, and to support their work within the communities they serve ("Ipas," 2012).

Ipas's work affects individual women seeking and undergoing sexual and reproductive health services as well as the general public. The organization trains health care providers, particularly those early in their career, engaged in pre-service training. Between July 2008 and June 2009, Ipas had incorporated educational resources and training on safe abortion care in eight countries (Bolivia, El Salvador, Ethiopia, India, Mexico, Nepal, Nicaragua, and Nigeria), reaching 14,659 trainees comprising medical students, nurses, and midwives (Ipas, 2010, p. 3). The countries in which the organization trains health care providers are countries where available information on abortion is often minimal because abortion is either illegal or stigmatized (Ipas, 2010, p. 3), making access to relevant and reliable, evidence-based health information particularly important.

Access to evidence-based health information and research serves to improve collective health as it informs reformation or creation of health policies. While

> public health is a relative newcomer to the area of research synthesis and evidence-based practice . . . the theme of evidence-based public health [now] dominates international, national and regional public health meeting agendas and the term "evidence of effectiveness" has become a central part of public health dialogue. Public health improvement plans . . . cite evidence of program effectiveness as requisite for considering intervention options to meet state health goals (Anderson et al., 2005, p. 226).

Policy recommendations, including national and international standards and guidelines for practice, are often the result of systematic reviews. Systematic reviews of various public health issues are increasingly important and useful for those engaged in improving clinical practices and health policy, as evidenced by the growth of the organizations such as the Cochrane Collaboration and similar organizations (L. M. Anderson et al., 2005). Public health improvements often "result from the introduction of evidence-informed policies or programs that affect the likelihood of acquiring a disease, the severity of the disease, the receipt of timely and effective care and treatment, and, for communicable diseases, the likelihood of disease transmission" (Fielding & Briss, 2006, p. 9696). As part of its efforts to improve service delivery of healthcare, Ipas assists in the production of systematic reviews informing standards and guidelines for clinical practice.

In fulfilling the goals of improving healthcare provision and practice, policy, access and knowledge around women's sexual and reproductive health and rights, Ipas and its fourteen international programs need access to communication systems, internally produced knowledge, and current, externally produced health and policy information. The organization utilizes an intranet to promote document storage, collaboration, and knowledge transfer, along with various communications systems to support both synchronous and asynchronous interaction among staff. The organization also includes a library, which "promotes the continual learning and evidence-based decision making that

empowers Ipas staff across the globe to excel in its mission" (Ipas, 2010), through the acquisition, organization, distribution, and preservation of internally and externally produced information and research.

THE IPAS LIBRARY COLLECTIONS AND SERVICES

The library's collection consists of over 22,000 items, with the majority of items in digital format (10,200 items), and other, tactile formats consisting of books, journals, vertical files, DVDs, CD-ROMs, VHS, archives (stored in Hollinger boxes), posters, and some three-dimensional objects. The library also builds and maintains specialized tools to improve knowledge in particular areas germane to the organization (e.g. a tool that contains references and digital access to all available national guidelines and standards on sexual and reproductive health services provision).

Reference services include literature reviews, location and retrieval of data, and extensive article retrieval. The bulk of reference services performed by the Ipas library depend upon digital resources. Among digital resources and services offered are searches of online catalogs (the Ipas Library's InMagic catalog and the University of North Carolina at Chapel Hill's catalog) and databases, and document delivery for Chapel Hill-based staff and distance users, which include remote, U.S.-based staff as well as international staff. The library also sends out newsletters summarizing current research and news covering different subject areas; employees may sign up to receive any of the fourteen different newsletters on a weekly basis through their email.

The library serves 135 full-time employees in Chapel Hill and 203 full-time international employees, as well as remote, U.S.-based employees and additional U.S.-based and international consultants. The international staff is located in Bangladesh,

Bolivia, Central America (based in Nicaragua), Ethiopia, Ghana, India, Malawi, Mexico, Nepal, Nigeria, Pakistan, Sierra Leone, South Africa, and Zambia. The staff is divided among multiple departments, with some staff serving in 'operational' departments (e.g. Finance, Human Resources, Office Services, IT) and other staff in mission-defined programs (e.g. Policy, Health Systems, Research and Evaluation).

Initial Ipas employee training includes a library orientation. For international staff, a lengthy welcome email points new employees to two online training videos on library tools and services as well as information on how to search the catalog. The email states that all Ipas employees who are not able to have an in-person library orientation are required to watch the three instructional videos within the first six months of their employment at Ipas. Although remote staff members are required to watch the instructional videos, no verification of completion through either electronic/digital means or follow-up correspondence occurs. Hence, the efficacy of the instructional videos in providing equivalent instruction to remote staff is undetermined.

Monthly statistics kept by the library on reference services over the past five years had revealed a significant gap in usage of reference services between U.S.-based staff and international staff, with U.S.-based staff accounting for about 90% of all reference services provided by the library (see Appendix A for data). Anecdotal evidence from credible Ipas staff members who have traveled to international offices further suggested that international staff use digital resources and services less than U.S.-based staff. The observations of staff members who reported usage differences often indicated that infrastructure and low knowledge of digital resources, tools and services within the

organization's intranet (including the Ipas Library site) contribute to underuse among international staff.

PURPOSE AND RESEARCH QUESTIONS

The purpose of this study was to identify the use, needs, and barriers to use of library services and resources by international staff at Ipas. The under-use of library services and resources among international staff suggested that international staff faced barriers that do not exist for U.S.-based staff. The study sought to identify the levels of use, needs, and barriers to use of Ipas library services and resources. The results will allow the library to determine if and how its resources, tools, and services can be made more useful to international staff. The results will be used to recommend changes to the Ipas Library in order to better support the work of international staff.

The research questions posed in the study of under-use of the Ipas Library among international staff were:

1) How does library usage among Chapel Hill-based staff compare to library usage among international staff?
2) Do other international organizations track or notice similar usage differences between users in high-income countries and those in low- and middle-income countries?
3) What resources and services do international staff at Ipas use?
4) What resources and services do international staff at Ipas need?
5) What types of institutional, informational, and infrastructural barriers to use of library resources and services does international staff encounter?

LITERATURE REVIEW

A literature review was conducted using PubMed, Library Literature and Information Science Full Text, Google Scholar, and ACM Digital Library. The databases were searched for articles discussing remote use of libraries, with preference for articles discussing international, remote use of library services and tools, particularly special libraries, health science libraries and information services, and library use in low-resource settings and/or low- and middle-income countries. A secondary search was conducted on ICT diffusion and adoption and infrastructural constraints affecting ICT diffusion and adoption in low- and middle-income countries.

LIBRARY DIGITAL RESOURCES AND SERVICES: LOCAL AND REMOTE USERS

Libraries in the public, academic, and private sectors are acquiring, distributing, and developing an increasing number of digital resources, tools, and services. The use of digital resources and services has the potential to increase the usability and accessibility of a library's collections and services not only to users within the library but also to remote users. Remote users "may be defined as any library patrons who access library resources from a location beyond the library's walls" (Graham & Grodzinski, 2001, p. 291), at varying geographic distances from the library. In providing resources and services to remote users, the Association of College and Research Libraries (ACRL) states that "Academic libraries must . . . meet the information and research needs of all these constituents, wherever they may be" (ACRL, 2008), placing special emphasis on

distance users who are geographically remote from the originating institution or library. As information and communication technologies (ICTs) have improved, remote users have come to include international users in low-resource settings. Despite the ACRL statement on the importance of meeting the research needs of remote users and the increased availability of digital resources and services, the literature suggests that libraries' digital collections and services are either under-utilized by remote users or not used at all.

Under-use vs. non-use of library resources and services

Under usage of library services by remote users is a concern, but non-use of library services is yet a larger problem and may be due to improper understanding of and subsequent attention to the needs of remote users. While it has been stated that even with local user groups, use (vs. non-use) of a library is a "minority event," the majority of research on library usage has nonetheless focused on library users, rather than non-users; "the so-called user-research has totally ignored the study of non-users leading to unbalanced ratio of user to non-user research due to extremely difficult nature of non-user studies" (Sridhar, 1994, p. 115).

Yet examining under-users and non-users of library services can help libraries restructure resources and services in order to improve service delivery to users—both those who under-utilize and those who do not utilize library services. In order to understand and address the disparities in information use and training needs of remote users, libraries need to understand their remote users—their locations, resource use levels and needs, and modes of access to information (Graham & Grodzinski, 2001, p. 292).

Characteristics and behaviors of remote users

In information seeking, barriers to use of information resources and services represent costs. These cost considerations for the individual can be represented as a consideration of cost vs. utility, in which

> the decision whether and where to seek knowledge [can be] represented as a compromise between the conflicting goals of a need for information that reduces uncertainty, and a resistance to time, effort, or monetary expenditures . . . [Among the costs are:] physical accessibility or availability (i.e., how close is the resource to the site of clinical practice), functional accessibility or searchability (i.e., how easy is it to find the needed knowledge in the resource once it is at hand), and intellectual accessibility or understandability (i.e., how easy is it to read and understand the information). [With health information], a fourth general cost characteristic is clinical applicability (i.e., the ease with which the knowledge obtained from the resource can be applied in the clinical setting) (Connelly, Rich, Curley, & Kelly, 1990, p. Aspects of Knowledge Resource Selection section, para 1-2).

The costs enumerated above may significantly contribute to under- or non-use among remote users, with distance and environmental constraints possibly amplifying the cost of information-seeking for the remote user..

One reason for under-utilization of a library may simply be the result of users using other, local libraries to which they have access (Toner, 2008, p. 25); while preferring to use local libraries rather than the remote institutional library may simply point to the importance of the physical environment of the library, it may also indicate that remote non-users of institutional libraries are not receiving equal service from the institution's library (Moyo & Cahoy, 2003, p. 290).

Non-use of library resources and services may also result from lack of knowledge of available services (Cooper, Dempsey, Menon, & Millson-Martula, 1998, p. 18 of 23). Library services and resources can be difficult to make known even to local users, requiring enormous amounts of time and dedicated efforts to promote new resources and

services (Calabretta, Cavanaugh, Malone, & Swartz, 2011, p. 25). With digital libraries, lack of knowledge of resources and services seems to be an even greater problem, with lack of marketing a significant reason for low levels of knowledge of a library's offerings.

> Most information consumers are not aware of the digital collections available to them from their community library, be it in a corporate, educational, or municipal setting. There is an awareness gap between the holdings of digital libraries and the communities they serve. Community members are largely unaware of the digital offerings of their community library (Buczynski, 2006, p. 112).

Two OCLC studies--2005 and 2010--*Perceptions of Libraries and Information Resources*, confirm issues of low levels of awareness of library digital resources and services: users of libraries in the United States, United Kingdom, Canada, Australia, Singapore, and India were aware of library websites and catalogs, but the majority of respondents were unsure or unaware of digital resources and services (e.g. online databases, electronic magazines and journals, online reference services) (OCLC, 2005, 2-7) (De Rosa et al., 2011; p. 40-41). Buczynski (2006) indicates that improper or lack of marketing may be a cause of low levels of awareness of digital resources and services among potential or actual library users.

Even for users of physical libraries, lack of awareness of digital resources poses a problem. Bolduc, (2008), conducted semi-structured face-to-face interviews with members of the International Labour Office (ILO) to determine staff perceptions of the library's resources and services. The qualitative study's results revealed that a quarter of ILO members surveyed felt that the library needed to do more to promote its services in order to make staff more aware of the library's services. Additionally, respondents felt

that courses and databases offered through the library were difficult to access due to poor placement within the ILO Library's pages on the intranet.

Lack of access to and familiarity with the hardware and software required to run or to use the library systems and digital resources is another potential contributing factor to under- and non-use of digital resources and services. Lack of knowledge or familiarity with the software or format of resources required for information seeking has been identified as a barrier to digital library usage even for users who are experienced with research and geographically close to their institution's library—in a survey of information seeking among faculty of a school of public health in Chicago, Wallis (2006) found that 77% of respondents indicated that they did not use some library resources and services due to lack of time to learn how to use those resources and services (p. 444).

Access to and familiarity with search strategies and query formulation may also be an issue for remote users of libraries. Basic issues of search formulation and the use of Boolean operators are prevalent beyond the sphere of digital libraries; in a study comparing the behavior of Internet experts and novices, Hölscher and Strube (2000) noted that experts' queries in our study revealed several differences: average query lengths for the search queries run through the search engine, Fireball, was 3.64 words on average for expert users compared to the average query length for all users, 1.66; additionally, expert users showed much higher use of Boolean operators than novice users (p. 340). Users of digital libraries resources show similar difficulties with search strategies. In a study of arts students' knowledge of search formulation using Boolean operators as well as how to identify the method for locating digital resources in a library

catalog, only 26% of students were able to correctly use Boolean operators and 22% able to locate a journal in the library catalog (Salisbury & Ellis, 2003, p. 213).

Search strategies and Boolean operators are information-seeking skills that might normally be addressed or discussed during the course of a reference interview (Jaros, 1990, p. 79) or formal instruction sessions. For remote users, collaborative technologies allow for live chat between librarians and patrons during reference interactions, while email allows for asynchronous reference requests and interactions. However, verbal and nonverbal cues may be absent from these communication technologies and user expectations of the immediacy of the librarian's response may affect the remote user's satisfaction with the reference interaction and therefore his/her learning outcome from the interaction (Sharifabadi, 2006).

Barriers to use of Digital Resources and Services in Low- and Middle-Income Countries

In addition to lack of knowledge of library resources and services, remote users in low- and middle-income countries potentially have additional barriers to use of library resources that reference interviews and online tutorials cannot address:, language and infrastructural issues. Libraries are not equipped to change the dominant language of publishing or improve the infrastructure of the populations they serve. However, an understanding of the conditions (environmental, political, and sociocultural) of the populations they serve can help libraries tailor their resources and services to meet the needs of their users in a way "that will best contribute to achieving development goals within local conditions" (WSIS, 2003, C3.J). Concerns over access to information are

central to the tenets of libraries, are notably emphasized in the American Library Association's (ALA) Library Bill of Rights, which states that

> Although digital information flows across boundaries and barriers despite attempts by individuals, governments, and private entities to channel or control it, many people lack access or capability to use or create digital information effectively.
>
> In making decisions about how to offer access to digital information, services, and networks, each library should consider intellectual freedom principles in the context of its mission, goals, objectives, cooperative agreements, and the needs of the entire community it serves (American Library Association, 2009).

Costs associated with information seeking may be increased for information seekers in low-resource settings, particularly functional accessibility. While information professionals have undertaken projects and services meant to extent information access to those in low-resource settings, many barriers to access and use still exist.

Knowledge of resources and services

Knowledge of and training on how to use information resources and services for geographically remote users pose problems. In a survey of distance education students at DePaul University, Cooper et al. (1998) found that the majority of distance education students "did not use, or were unaware of most of the services" (p. 18 of 23) offered by the library. The authors note that quality service provision for remote users "depends on relationships with the local site, the sponsoring institution, and technology. This is because [advanced information] technology makes personalized attention and individualized service increasingly important" (p. 20 of 23). The authors go on to state that "while e-mail reference, electronic request forms, Web page posting of library distance learning policies, and Web-based library instruction have their places in providing services to remote users," they may not be adequate in providing distance users

with the information and training they need to access and realize full use of library resources and services (p. 21 of 23).

Outside of the realm of distance education, in a study of knowledge and usage levels of the National Library of Medicine's (NLM) information services among librarians in Africa, researchers Kanyengo, Ajuwon, Kamau, Horta, & Anne (2011) found knowledge and usage of the NLM products and services among members of the Association for Health Information and Libraries in Africa (AHILA) to be low. The results of the questionnaire administered to AHILA members showed that 35% of respondents were entirely unaware of MEDLINE/PubMed, and 52% had never used MEDLINE or PubMed (p. 261-2). Knowledge and usage of other NLM information products and services was yet lower among AHILA members, a finding which the authors attributed to the more specialized nature of other NLM products and services, in addition to lack of awareness of those products and services.

Similarly, in a study on the awareness, use, and access barriers to online medical information in Cameroon, Nigeria, Tanzania, Uganda, and Gambia, surveys given to postgraduate medical students and research scientists in those countries revealed that while Internet usage was high, knowledge of free or open access sites for medical information varied widely, with PubMed being the most widely known site and others, such as BMJ, the Cochrane Library, and HINARI being much less known (Smith et al., 2007). HINARI is a "programme set up by WHO together with major publishers [to enable] developing countries to gain access to one of the world's largest collections of biomedical and health literature." (World Health Organization, 2013) Although known by some of the postgraduate students, HINARI was less utilized than other resources due

to issues related to passwords. The respondents reported that passwords were guarded "by administration or librarians, who either do not make them readily available, or who 'may not always be available to provide them'" (p. 4-5 of 7). Lack of awareness of the resources, in this case, was compounded by lack of knowledge of passwords required to utilize the resources.

Technological and infrastructural barriers

Technological and infrastructural issues constitute significant barriers to the use of digital resources, whether those resources are through libraries or international initiatives. Even when resources are known to users, uptake of tools and services that allow access to digital resources is affected by the reliability of the Internet connectivity and electricity. The Smith et al. (2007) study noted that, in addition to lack of knowledge of resources and services available to postgraduate medical students, technological barriers significantly affected access to use of library and information resources.

> Almost all respondents mentioned problems with hardware, Internet connections and computing facilities at their institutions. Many comments related to interrupted power supply, typically, "one of the things that disturbs the connection is the electricity; if the electricity goes off, then we don't have a connection" and "power offs present another obstacle to accessing Internet based information effectively". Others commented on the quality of the connection, typical responses were "at times the connection is really slow and even slower for sites with images" and "there are also cases where logging in to some databases like HINARI takes long, after waiting for so long you get a message that the connection has failed". Others described a need for institutions to improve computing facilities including the number of computers available for users and reducing the cost of machines for postgraduates (p. 5 of 7).

The ability to utilize digital resources and services rests upon basic issues of infrastructure such as reliable electricity and Internet connectivity. As stated in the World Summit on the Information Society (WSIS) *Plan of Action*, goal C2 *Information and communication infrastructure,* "infrastructure is central in achieving the goal of digital

inclusion, enabling universal, sustainable, ubiquitous and affordable access to ICTs by all" (WSIS, 2003, C2.9). Achievement of action line C3, 'access to information and knowledge' depends upon the preceding goal.

Access to digital resources and services also depends upon having the means of accessing them. Accessibility of digital resources depends not only the computing devices that allow access but also a reliable Internet connection. A reliable Internet connection not only provides users with the ability to locate and use resources, but allows for increased familiarity with information-seeking skills that will decrease the costs involved in information-seeking. There is a significant difference in the Internet connectivity and use in high-income countries than in low- and middle-income countries. In an analysis of Internet connections and use between those in high-income countries (HMIC) and those in low- and middle-income countries (LMIC) as of 2010, the Internet Telecommunications Union (2011, p. 2) estimated that per 100 inhabitants, fixed broadband subscriptions were held by 23.6% of the population in HMIC vs. 4.2% in LMIC; mobile broadband subscriptions were held by 46.2% of the population in HMIC vs. 5.3% of the population in LMIC; and Internet users account for 68.8% of the population in HMIC vs. 21.1% of the population in LMIC. The estimates of Internet users as a percentage of the population by income group (WiderNet Project, n.d.) look more like the data shown in figure 1, (below) which displays the disparities in Internet use and uptake, as well as the increasing disparity between Internet usage in high-income countries and low- and middle-income countries.

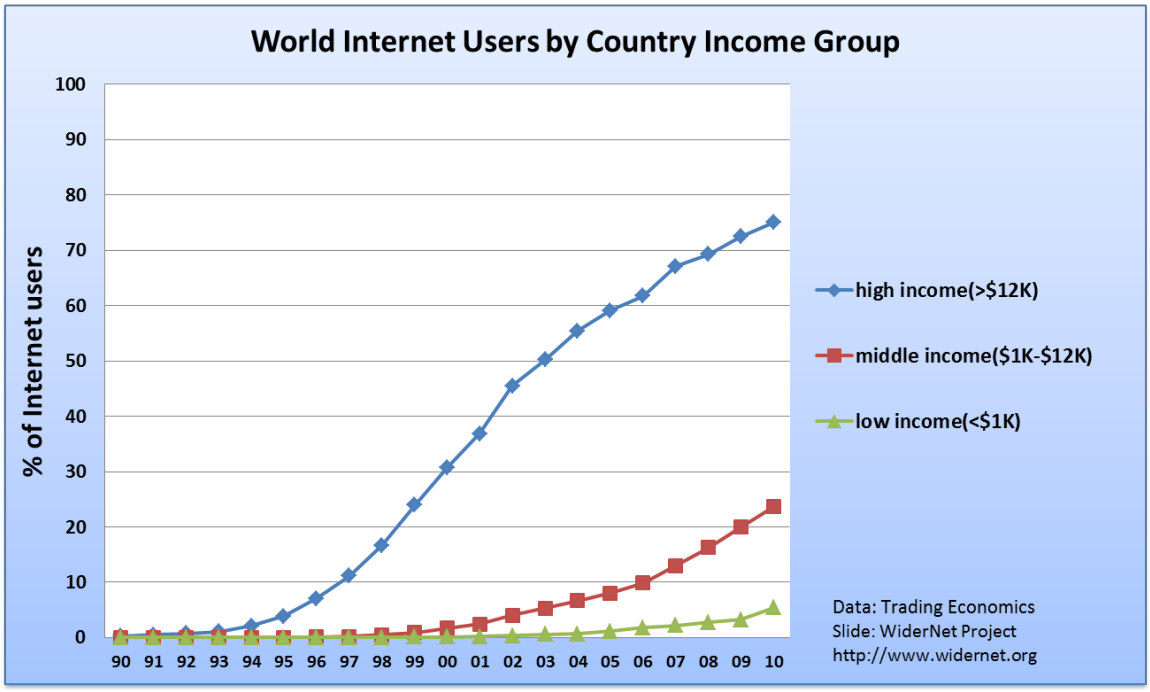

Figure 1: World Internet users by country income group. Illustrates how state economic stratifications affect Internet uptake and usage and the widening of the gap over the period of time 1990-2010.

Even for those in low- and middle-income countries with access to the Internet, the bandwidth available is significantly slower than for users in high-income countries, slower bandwidth inhibits access to digital resources both by making downloads of specific resources lengthy and by making the programs used to access digital resources more difficult to operate. As Dutta and Roy (2005) state, "chronic infrastructure deficiencies, low literacy levels, insufficient experience with technology, and inadequate regulatory structures produce complex interactions" (p. 143) that affect diffusion of digital innovations and information.

Unreliable energy sources can significantly hamper access to information; "demand for energy is a 'derived demand': people do not want energy in itself but the

'energy services' it provides" (Great Britain. Dept. for International Development, 2002, p. 5). Maranz (2001) corroborates the reports of unreliable electricity. He states that

> in many cities [in Africa] the demand for electricity exceeds the capacity of the power utility to provide reliable service . . . There are many reasons for the power shortages, but the common solutions taken are at the micro level: power cuts are made on a random basis, decided moment by moment, or on the basis of favoring sectors where politically important people reside (p. 6).

Electricity losses in low- and middle-income countries may last from minutes to hours. In a survey on power outages experienced by businesses in Nigeria, for instance, 69% of those surveyed reported that the average duration of power outages experienced lasted from 1-6 hours, with an additional 25.5% of respondents reporting that power outages have a average duration of more than 6 hours (Adenikinju, 2005, p. 23). Electricity losses are commonplace in developing countries and result from a combination of technical and non-technical causes.

> Technical losses occur naturally and consist mainly of power dissipation in electricity system components such as transmission and distribution lines, transformers, and measurement systems. Non-technical losses are caused by actions external to the power system and consist primarily of electricity theft, non-payment by customers, and errors in accounting and record-keeping (Antmann, 2009, p. 3).

Electricity loss from either cause result in connectivity losses that interrupt online information-seeking, including web searching and downloads of digital resources. Even within low- and middle-income countries with higher average annual consumption of energy per person, distribution is inequitable and access unreliable, with significant energy and connectivity gaps between rural and urban areas, and even within poverty areas and wealthy areas, with energy supply "reflecting income inequality and limited availability of services" (Gaye, 2007, p. 5).

Internet connectivity is equally a reflection of socioeconomic differences. In a study of Internet connectivity in rural Zambia and South Africa, Johnson, Pejovic, Belding and Van Stam (2011) found that network constraints and setup in the two rural areas of study had an impact on the manner in which information was accessed—both the type of Internet traffic (web traffic vs. peer-to-peer traffic) and the manner in which digital resources of large size are exchanged (on a USB key as opposed to downloading or sharing through a peer-to-peer network), as well as the spread of malware across the networks. The authors note that some of the issues identified in the study could be addressed by changes to the network setup (caching behavior, content servers, and routing within the network (p. 501), requiring technical solutions as well as constant updating. They note, however, that a fundamental, underlying concern is the accessibility and performance of the Internet outside of Internet cafés and larger institutions, and that connectivity in rural areas is a compound phenomenon, where

> Satellite connections are slow, often with bandwidth of only a few hundreds of kbps or 1 Mbps; power sources are unreliable and devices are frequently unavailable; networks are managed remotely or by poorly trained local staff; and public Internet cafés have limited availability and high per minute usage costs (p. 494).

Additionally, even when some of the technical requirements for performance improvement of the network in rural settings are addressed, the increase in resource size and media complexity taxes the available bandwidth in rural areas as the amount of data that must be sent across networks increases, widening the digital divide (p. 502).

Provision of reliable electricity and connectivity is not a service that libraries and information centers can change or influence. Efforts to improve infrastructure must occur through political efforts and infrastructural investments at regional and state levels by

policymakers, engineers, information technology professionals, and other organizations and individuals able to mobilize political and economic capital to effect such changes. Libraries that provide digital resources, particularly those requiring Internet connection, accessed through technologies requiring energy, can, however, address the method of delivery of digital resources, tailoring resource and service delivery to the conditions of users in order improve uptake and usage.

The use of mobile phones as a means to access the Internet is one notable method of increasing the accessibility of digital information resources and services, particularly in the developing world. As a means of tailoring delivery of information to the population being served, libraries have increasingly adopted mobile sites to increase the accessibility and use of resources and services. Mobile catalogs, subject guides, reference services, and technology services have been implemented at various public and university libraries (Bridges, Rempel, & Griggs, 2010).

Not all library services and resources can be successfully adapted to mobile devices; a case study at Ball State University Libraries (BSUL) found that a Mobile Journals service was not successfully implemented due to incompatibility with mobile devices of some the journal databases to which the library subscribed. While not all information delivery systems at BSUL worked well through mobile phones (such as a journal finder service), the library's website was successfully adapted to the more limited memory, display, and connection capabilities of mobile devices (West, Hafner, & Faust, 2006). The uptake and usage of mobile library services and resources is inconclusive in developed countries. The Texas A&M University Libraries found that respondents to a survey on the libraries' mobile services mostly accessed the mobile site for location-

specific information (hours, directions, call numbers) or did not use/were unaware of mobile services. Usage statistics of the EBSCO mobile services indicated that the monthly average for mobile searches was 200, with only 12 full text downloads per month; by contrast, the non-mobile (regular) EBSCO services had 74,454 monthly searches on average, with 5,056 full text downloads (Ponsford, 2011, slide 23). The display limitations of mobile devices for scholarly information seeking, combined with the reliability of the connection and electricity for laptop and desktop devices may make users in developed countries more apt to access digital resources from (non-smart phone) computer devices.

For developing countries, limited access to computers, lack of reliability of Internet connection, and energy seem to contribute to a higher use of mobile phones as information access devices. Mobile access to information has been particularly important for developing countries, with some critical information resources such as pill identification resources greatly increasing consumer health safety (Ogunlesi & Busari, 2012).

> With a dearth of infrastructure, the vast majority of people (an estimated 1.5-billion globally, according to the UN) have no electricity. More people in Africa have a mobile phone than access to electricity. That means, for a phone to be functional, it needs decent battery life These feature phones have anywhere up to a week. . . Computers have always been too expensive for the majority of Africans, most of whom have never had a home phone line. A cellphone is cheaper to buy, cheaper to run and is always on you.
>
> In South Africa, for instance, Google says 25% of its searches during the week are via mobile, rising to 65% on the weekends (Shapshak, 2012).

Linguistic and cultural barriers to use of library resources and services

In addition to critical issues of access to resources and services offered through libraries, language can also act as a barrier to use. Many of the studies around

technologies and broad issues around multilingual resources and their representation and accessibility have been studied, yet studies of multilingual users' needs have not been adequately examined. Wu, He, & Luo (2012) conducted a survey of multilingual users of libraries in 19 different countries in order to examine needs and expectations of multilingual users of digital libraries, differences and expectations of users according to country of origin and language group, and characteristics of user groups according to needs and expectations of multilingual resource processing. Multilingual users of academic digital resources (journal articles, web information, and books) reported using translation tools (58%, with 86% of respondents dissatisfied with the results) and 68% percent of the participants felt it was too difficult to look for information in a language that they do not understand (p. 188), resulting in non-use of information resources. An examination of the study's multilingual users' expectations indicates that while some of the multilingual user expectations of library services were unreasonable, the barriers to use and low levels of satisfaction with services reveal that digital libraries may not be sufficiently serving the needs of multilingual users, beginning with inadequate understanding of those users' needs. Kanyengo et al. (2011) also identified language as a primary barrier to use of NLM products and services among AHILA members.

Language is often intertwined with culture, which comprises a set of factors that may also affect library use. Culture is an important consideration in information seeking, defining the set of behaviors and values involved in information-seeking. Maranz (2001) posits that unfettered information sharing and exchange through the Internet are themselves cultural institutions reflecting a very Western world view:

> Westerners share their thoughts and knowledge much more freely than do Africans. The Internet and the countless scientific journals that publish the latest

> in research findings are archetypal examples, designed in the West and reflecting many Western values. One of these is the belief that society will benefit from a free sharing of information (p. 32).

In this way,. Both the production and consumption of information are affected by cultural beliefs.

Culture also affects human-computer interaction and user experience and comfort with interfaces (Lodge, 2007). Komlodi and Carlin (2004) state that "[Edward T.] Hall's speed of messages, high and low context, and information flow dimensions, and action chains; [and] [Geert] Hofstede's power distance, individualism/collectivism dimensions, and uncertainty avoidance" (p. 5) are dimensions of culture affecting information seeking behavior. The degree to which cultural values pose as barriers to information seeking is difficult to measure, however. Marcus and Gould (2000) describe the ways in which dimensions of culture affect user-interface and web design, but give no indication of how dimensions of culture affect user experience with a website. While cultural factors may constitute barriers to digital resource and service use, this study does not seek to identify those barriers through the survey, since research accurately identifying culture as a barrier to Ipas Library use would require observational, ethnographic study and perhaps some additional user-interface interaction analysis

METHODOLOGY

This is a mixed methods study. For the purposes of this research study, data was gathered to determine current usage levels of Ipas Library resources and services by international staff at Ipas, as well as any unmet needs or barriers to use of library resources and services. Monthly statistics on resource and service use among Chapel Hill-based staff and international staff were compiled in order to examine usage differences between the two populations. Data was also gathered on bandwidth for selected Ipas office. The study also included querying other libraries and international organizations to determine the prevalence of the problem of usage disparities between users in high-income countries and low- and middle-income countries.

QUALITATIVE STUDY

Overview

A preliminary, informal examination of the prevalence of usage differentials between populations in developing countries and developed countries for other organizations was undertaken. The organizations were contacted in order to ascertain if they experience lower usage levels of digital resources and services among users in developing countries. In order to examine the issue from a broad spectrum of digital resource and information providers with an international distribution of resources and services, the organizations varied in size and scope of information provision.

Population

The organizations that were contacted were:

Wikipedia

World Health Organization Library

National Library of Medicine

FHI360

World Bank, Education Sector

Hewlett Foundation, Open Education Program

These organizations were queried about whether or not they kept statistics on geographic location of their users and any issues they may have noticed regarding accessibility and use of digital resources and services for those in low-resource settings. Responses were used to inform the literature review and survey design.

QUANTITATIVE METHODS

Analysis of differences in usage levels between U.S.-based and international staff

Differences in usage levels of Ipas Library resources and services was analyzed by means of gathering and compiling library metrics from the past five years. The metrics examined included reference services, public access catalog usage, and Ipas Library site visits. Reference statistics kept by the Library included statistics on U.S.-based users and international users. Public access catalog usage and Ipas Library site visit statistics include distinction between in-office users and remote users.

Additionally, data was gathered on bandwidth speeds for the Chapel Hill office and select international offices in order to inform analysis and understanding of

connectivity issues and performance experienced by international staff and Chapel Hill-based staff.

Survey of international staff on usage, needs and barriers to use of Ipas Library

Survey foci

An appraisal of Ipas international staff members' use of library services and resources, as well as barriers to use they experience was conducted by means of a survey. The survey consisted of three principal, loose groupings: 1) demographic factors of users; 2) current usage levels of library resources and services; and 3) unmet needs and barriers to use. The survey questions for this study may be found in Appendix E.

Participant population

Recruitment for survey participants consisted of identifying international staff members from departments with higher demonstrated need for research support in their work. Members of the departments of Community Access, Health Systems, Policy, Research and Evaluation, and Youth were identified using office organizational charts; U.S.-based staff and consultants in the five departments were excluded, the former due to their location in a high-resource setting and the latter due to the short-term nature of their work with the organization. Although 92 participants were identified, between the time the participants were identified and when the survey was sent, the survey invitation was sent to 84 participants.

Distribution, duration, and response rate

The initial recruitment letter was sent through an email to the respondents on February 20th and the survey was made available for a period of four weeks, with a

reminder sent after two weeks, on March 6th. Over the four-week period of time, 24 responses were received. During the first two weeks, 9 responses were received, and after the email reminder, an additional 15 responses were received. Among the total responses, there were 3 incomplete and 21 complete responses. For the purposes of this study, only the complete responses were included. The survey resulted in a 25% response rate.

BENEFITS OF THE STUDY

Results from the study will be used to analyze current Ipas Library resource and service delivery to international staff and identify factors that act as facilitators or barriers to usage of library resources and services. Using survey results, recommendations for improvements to service delivery for this population will be made. It is hoped that recommendations resulting from this survey will result in restructuring Ipas Library resources and services that will allow the library to better serve international staff in the organization, ensuring equitable access among all members of the organization.

FINDINGS AND DISCUSSION

COMPARATIVE USAGE LEVELS

Significant Library usage differences exist between Chapel Hill-based staff and International staff. Examination of five years of Ipas Library metrics included an analysis of reference services delivered (ready reference and lengthy reference services) and showed that and average of 171 ready reference questions are answered for U.S.-based staff per year, while the yearly average for ready reference questions answered for international staff was 21.6. Similarly, for reference services (requiring at least half an hour to complete and usually comprising literature searches and/or bibliographic or library instruction), U.S.-based staff received yearly average of 150.1 hours; international staff received an average of 17.2 hours (see Appendix A for the metrics per fiscal year). For both Ready Reference and more extensive reference services, ~89% of services performed by the library are delivered to U.S.-based staff (40% of the total staff) vs. 11% to international staff (60%) of total staff. Notably, while delivery of reference services has increased for U.S.-based staff in the past five years, reference services usage have decreased for international staff. The reasons for the decline in usage of reference services is unclear, but may simply indicate that international staff have increasingly gained access to information resources (libraries and/or digital resources) in the locality where staff work or through the organization's intranet and are therefore more able to work independently of Library staff in order to access information.

In order to determine if independent information seeking among international staff has increased as reference services provided to international staff have decreased, the data on library public access catalog usage was examined. Data for public access catalog usage only exists for the past two years and no correlation between decreased usage of library reference services among remote staff can be determined for the years 2008-2010. 'Remote usage' is considered usage of the library portal from an IP address outside the range of IP addresses registered to the Chapel Hill office

At first glance, the data showed that for the two years of data available, remote use seems to have remained fairly constant while in-office use has declined (see figure 2, below, or Appendix B for exact data). While the data seem to indicate a convergence in usage rates of the library's public access catalog, the proportion of Chapel Hill-based staff to international staff must be taken into account. A simple calculation of the total of remote hits on the library public access catalog reveal an increasing percentage of remote hits over time, going from remote hits accounting for roughly 14% of hits on the public access catalog for the period February 2011-January 2012 to about 27.8% of hits for the period February 2012-January 2013. While the increased hits on the public access catalog are encouraging, international staff account for 60% of the total full-time employees at Ipas, making the usage levels per person among that group much lower. The statistics show two large, spikes in remote use of the library's public access catalog, which could have skewed the statistics and could indicate that: 1) international staff had a time-limited, project-specific need for library resources; 2) U.S.-based remote staff were using the catalog heavily; or 3) Chapel Hill-based staff were either working from home or travelling for conferences and congresses.

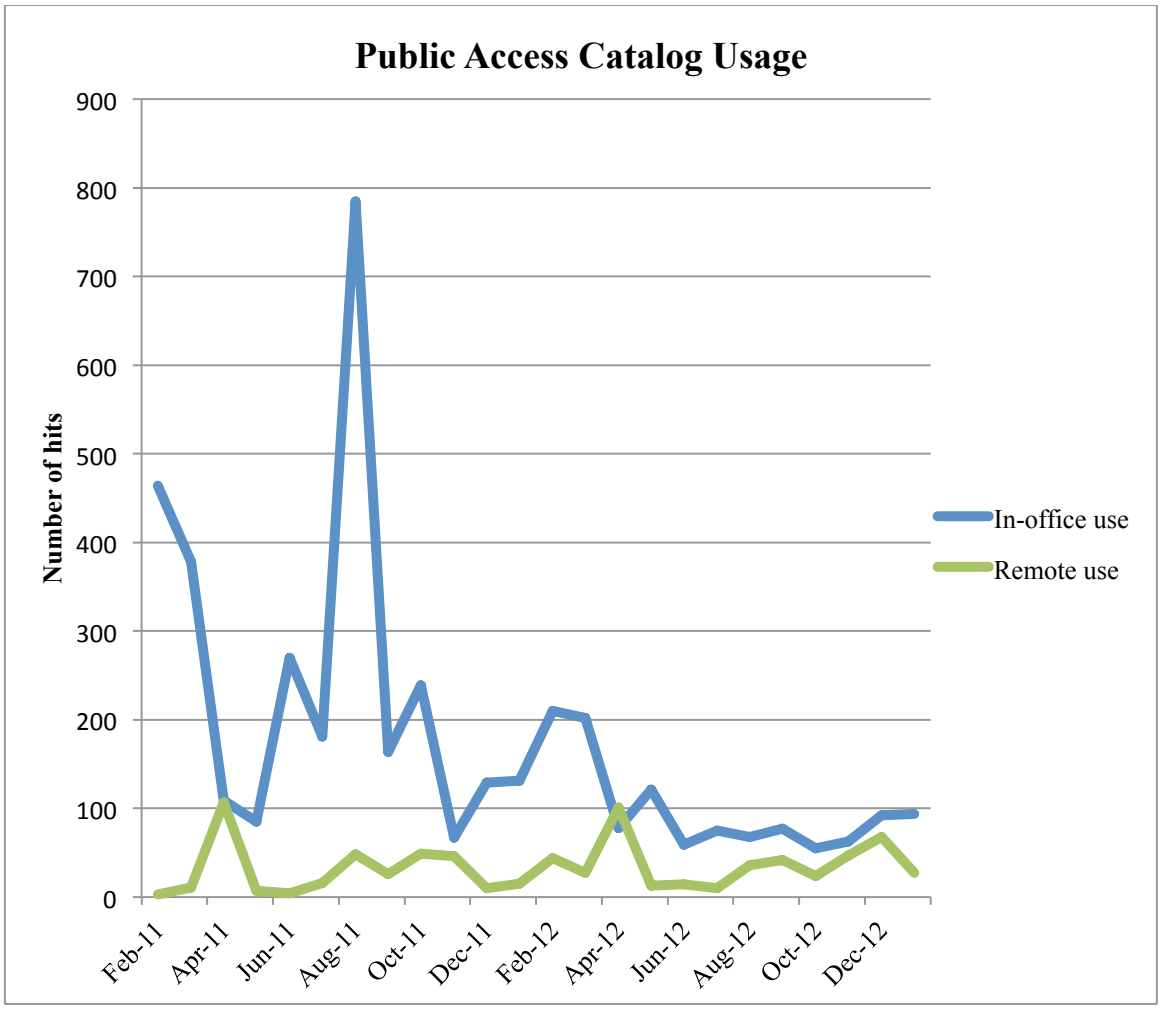

Figure 2. Public access catalog usage among in-office and remote staff. This figure illustrates the decreasing use of the public access catalog in the past two years and the closing gap between remote and in-office users.

In addition to data on public access catalog usage, the library has inconsistently kept statistics on library website usage. Inconsistencies in the data collection as well as some notable inconsistencies in the numbers for a period of five months make the data on website use an unreliable indicator of the usage of the library site (See Appendix C: Library Website Use for the available data). There may have been some confusion about the statistics that were to be kept, with the five-month period of elevated numbers being Ipas Library website hits totals as opposed to the number of unique users to the Ipas

Library website. Anecdotal evidence suggests that international staff members use of the library website for access to e-resources and tools outside of the catalog, but lack of reliable data, including lack of tracing the IP address of users for the site make this impossible to verify.

Bandwidth for international offices was also gathered for the purposes of assessing connection speeds experienced by international staff. Both the bandwidth the organization pays the Internet service providers (ISP) and the actual bandwidth were obtained. The Chapel Hill office purchases 10 MB/sec of connection speed and obtains an actual speed of 9.22 MB/sec, while the international offices pay for ≤ 2 MB/sec but obtain ≤ 0.82 MB/sec. with the actual speed of the office Internet being less than half of the advertised speed (see Appendix D for table and chart). IT staff in the organization report low uptake of the organization's intranet in general among international staff, speculating that the combination of a slow Internet connection and having to use an intranet that is remotely hosted (in Chapel Hill) make the use of the intranet inefficient except for coauthoring of documents and other necessary collaborative processes with others in geographically remote locations. The Ipas Library website is embedded within the organization's intranet and it stands to reason that remote use of the intranet with such low connection speeds is a probable cause of relatively low usage of the Ipas Library website by international staff.

PREVALENCE OF PROBLEM FOR OTHER ORGANIZATIONS SERVING INTERNATIONALLY DISPERSED USERS

None of the organization representatives contacted for this study reported that they explicitly track the geographic regions of their users. The World Health

Organization Library representative reported that the Library keeps no statistics whatsoever and while the librarians redirected the inquiry to the World Health Organization's web team, no further reply was received. The representative of the United States National Library of Medicine reported keeping statistics on total hits on PubMed per day along with unique number of users, but stated that the PubMed web team keeps no statistics on the geographic locations (specific location or world region) of users. Similarly, while FHI 360 reported that they do keep some library metrics, they do not keep statistics on the geographic location of users accessing the organization's resources and services. Wikipedia does not keep any such statistics, although other organizations inconsistently track use of Wikipedia by broad world regions. When examined, the data kept by other sites on Wikipedia usage was too inconsistent along global region and country levels to be sufficiently indicative of usage differences between users in high-income and low- and middle-income countries.

The UNC Health Sciences Library provides an online LibGuide to Pediatric residents at hospitals in Uganda. The issue of usage of the Uganda guide was discussed with the librarian responsible for the guide and involved in the program. She indicated that the guide had been promoted among the program staff in Uganda and made available to the pediatric residents, but that usage of the LibGuide was very low and cited connectivity issues and knowledge of the LibGuide's existence and contents as the most likely the causes behind the very low adoption and usage of the guide (M. Lackey, personal communication, October 4, 2012). Since the guide is only intended for residents in Uganda, comparative usage levels are nonexistent.

Michael Trucano, Senior ICT and Education Policy Specialist at the World Bank, responded that he knew of no organizations that track usage levels of digital resources and services by the groups specified. He did suggest several factors that may contribute to usage differences between the two groups: 1) US-based staff are more likely to be Americans, and have grown up in a culture where library use is more common; 2) U.S. library resources are more useful; 3) U.S.-based staff are more comfortable working in the dominant language of publishing, English; and 4) the jobs held by U.S.-based staff are more likely to require use of library resources (M. Trucano, personal communication, March 19, 2013).

From the informal queries of other organizations serving international users in low- and middle-income countries, the prevalence of under- and non-use among users in those settings is not adequately measured. Although Mellanye Lackey noted that underuse was a problem among those in low- and middle-income countries, the other organizations queried did not indicate that they either assumed or recognized a problem of underuse among remote users in under-resourced areas. The lack of tracking of information resource and service use by country or geographic region makes it impossible to definitively determine the extent to which the usage differences identified in the Ipas Library is comparable to that found in other organizations.

INTERNATIONAL USER SURVEY FINDINGS

The survey results indicated that international staff at Ipas use the Ipas Library infrequently, with 53% of respondents using the Ipas Library less than once a month or never and three respondents abstaining from giving information on library use frequency. Colleagues, followed by personal resources, were the most frequently consulted

information sources for work purposes. The singularity of this attitudinal and behavioral aspect of information seeking among international staff is unknown and would require further study to determine the extent to which the preference for consulting colleagues and personal resources over looking for information in office resources or libraries may be prevalent among staff based in Chapel Hill.

Respondents report needing the materials that the Ipas Library makes available, such as journal articles, government publications, and curricula, but reported using online databases outside the Ipas Library to find such materials. Google is used by 85% of respondents, PubMed 60%, Google Scholar 35%, and POPLINE 30%. Respondents also report searching the Ipas intranet, Luna, for resources. The use of either external databases or the organization's intranet would fail to point to or retrieve digital resources in the Ipas Library.

Among the library services and resources that international staff uses, the most heavily utilized resource was the Standards and Guidelines tool (which contains all available national standards and guidelines on abortion and postabortion care), with 62% of respondents reporting use of the tool. The Current Awareness Newsletters (38%) and online journal access (38%) were the next most utilized services.

The primary barriers to use of library resources appear to be informational and related to insufficient training. Several respondents indicated a need for training on library resources and services, with 62% of the respondents reporting they have never received training on the library's resources and services. Additionally, respondents indicated a broader need for more training on the organization's intranet as a whole. Roughly 58% of respondents report having worked for Ipas for 5 years or less, the time

period during which the Welcome email was distributed to new, remote staff as a matter of policy. The 62% of respondents who report having never received training may have either not been a part of the group that received the Welcome email or not considered the email to be sufficient training.

Infrastructural barriers appear to exist, although may not be the determining factor in lower usage levels of Ipas Library services. Most respondents indicated that their Internet connection was at least fair or good. It is notable, however, that the respondent's perception of the speed of their Internet connectivity is relative and may reflect the fact that the Internet connection is much more reliable in the Ipas offices than in other places where the international staff member lives and works. Although 71% of respondents report their Internet connection as being 'Fair' or 'Good', the data on the actual bandwidth in Ipas offices reveals a significant average 20:1 gap in bandwidth experienced by Chapel Hill staff and international staff.

Electricity loss with a frequency of at least once a week was reported by 39% of respondents, with the addition of reported loss of electricity at least once monthly making electricity loss an experience of 58% of respondents. Any loss of electricity would affect accessibility of the organization's intranet and the Ipas Library's site and resources within the intranet would certainly be affected by periodic loss of electricity and may contribute to lower usage levels. The duration of electricity losses was not assessed by the survey and would have given more information about the degree to which electricity loss affects digital resource and service accessibility for international staff.

Discussion of the survey results

In general, the survey results indicate that roughly half of international staff utilizes the Ipas Library's resources and services at least infrequently and that staff who are aware of the Ipas Library's services appreciate the efficiency of the library. The survey findings indicate, however, that the Ipas Library is not the first choice for international staff seeking information. Use of Google and PubMed is higher than use of the Ipas Library site and catalog, but it is notable that this finding is not at all inconsistent with findings from other studies on search behavior when seeking scholarly sources; Google and PubMed may be more familiar to information seekers and have a greater perceived ease of use and access (Griffiths & Brophy, 2005). The Ipas Library may need to make international staff aware of the library's ability to acquire and distribute scholarly articles to which international staff may not have access but which they have found through external Web searches.

The Ipas Library may need to increase and improve its training efforts for international staff. While the current Welcome Letter email sent to new international staff and the three required training videos contain information about the Ipas Library's resources and services, the content and format for delivery may be problematic. Neither the email nor the videos allow for interaction between the librarians and the new employee, an interaction which normally allows for training sessions to be tailored to the knowledge levels and work needs of the employees and for the employee to pose questions that will aid in his/her understanding of processes and concepts being communicated. Furthermore, the lengthy email that directs new employees to the online videos may become lost in the initial flurry of emails sent by the organization.

Either Voice over IP services or collaborative software already used by the organization might be an effective method of more direct, dedicated training for international staff, either as a group training session or an individual training session offered to international staff. Additionally, the library might need to engage in promotional activities to remind international staff of the services and resources available to them. Without the regular, visual cue of the physical library, international staff may simply forget the library is available to serve their needs.

Conclusion and Implications for Further Study

This study examined the differences in use of Ipas Library resources and services among Chapel Hill-based staff, the prevalence of differential levels of usage between users in high-income countries and low- and middle-income countries for other organizations, and the use, needs, and barriers to use of Ipas Library resources and services among international staff in the organization.

The available statistics on library usage revealed that there is a difference between the usage of Ipas Library resources and services among U.S.-based and international staff at Ipas. The difference in delivery of reference services between the two populations revealed a significant difference in Ipas Library service usage. Reasons behind lower usage of reference services among international staff are unclear, but may be due to lack of awareness of the library services available to international staff, as survey results suggest. Underuse among international staff may also be related to the general underuse of the organization's intranet, as anecdotal evidence suggests. Further comparison between U.S.-based and international staff would require a study of U.S.-based staff use, needs and barriers to use of Ipas Library resources and services.

The investigation of prevalence of the problem for other libraries and information service centers did not result in a definitive answer. While the organizations contacted did not say they kept statistics on usage differences between the two populations, neither did they state they were getting equal use of digital resources and services between the two groups. Anecdotally, the disparate use levels among those in high-income countries and those in low- and middle-income countries appeared to be a problem, but there was inadequate measurement of the gap in information services and resources uptake.

The lack of measurement of usage by country income group is intriguing. The reasons behind lack of measurement merit further study. Several questions arise concerning the reasons behind the non-measurement: First, are libraries serving these populations concerned that the problem may exist? Secondly, if libraries are concerned, is non-measurement due to lack of funding or staff to gather statistics on the geographic region of users? Parsing data on the geographic region of users would require tracking the IP addresses and mapping the IP addresses to the geographic region of origin. The process may be a time-consuming one for larger libraries with many more international users than Ipas. Thirdly, is underuse of resources and services among users in low- and middle-income countries one that would be impolitic to reveal? It is possible that revealing disparities in use may imply 1) inequalities in service delivery; and 2) improper consideration of socioeconomic factors that lead to inequalities in service delivery and access, either of which may bring up ethical concerns for a library or information center with global users. Additionally, pointing out lower levels of use among those in low- and middle-income countries may raise concerns of inadvertently suggesting inadequacy of

the remote users themselves. Lastly, it may simply be generally assumed that infrastructural impediments alone are the reason for underuse in remote areas.

If libraries assume that users in low- and middle-income countries encounter significant infrastructural barriers to digital information resources and services, those assumptions would presumably shape the libraries' solutions to under- and non-use among those populations. Addressing the causes of under- and non-use would seemingly affect the design of information resource and service delivery. How much the consideration of infrastructural barriers factors into a library's decisions on resource and service delivery, the degree to which libraries characterize infrastructural barriers in terms of scope and severity, and the particular ways libraries serving those populations make decisions to address these assumptions are questions that merit further study.

Although most of the international staff at Ipas included in this study did appear to use Ipas Library resources and services, albeit infrequently, survey results also indicated several barriers to use of the Library.

The primary barrier to use was inadequate training on and knowledge of Ipas Library resources and services. Although training is offered to international staff, the format—email and online videos—may not suit the technological constraints experienced by international staff, especially unreliable electricity and connectivity, constraints which may hinder the accessibility of the training. Furthermore, the email and the videos may not satisfy the preferred learning methods of international users.

Infrastructure irregularities appear to be contributing factors to lower usage levels of the Ipas Library services and resources among international staff. The library may need to collaborate with IT in the organization to discuss what, if any remedies exist for

infrastructure-related barriers to delivery of digital resources and services. Further study may be necessary to determine the extent to which software and hardware issues contribute to lower usage of the Ipas Library among international staff.

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APPENDIX A: LIBRARY REFERENCE SERVICES METRICS

Fiscal Year	Type of Service*	U.S.-based staff	International Staff
2008 (July '07-June '08)	Ready Reference	205	45
	Reference services	128.5	20
2009 (July '08-June '09)	Ready Reference	159	19
	Reference services	111.5	21.5
2010 (July '09-June '10)	Ready Reference	169	22
	Reference services	140.5	24.5
2011 (July '10-June'11)	Ready Reference	161	7
	Reference services	195	6
2012 (July '11-July '12)	Ready Reference	163	15
	Reference services	175	14

*Ready Reference is measured in number of questions answered and is considered any question requiring less than 30 minutes to answer; reference services are services prompted by questions that involve open-ended searching. Reference questions do not include finding a specific item in the catalog or retrieving a specific article for someone, which is accounted for in document delivery metrics kept by the library.

APPENDIX B: PUBLIC ACCESS CATALOG USAGE STATISTICS

Month, Year	In-office Use	Remote Use	Remote Use as % of Total
Feb 2011	464	3	0.64%
March 2011	378	11	2.83%
April 2011	109	107	49.54%
May 2011	85	7	7.61%
June 2011	270	4	1.46%
July 2011	181	16	8.12%
August 2011	785	48	5.76%
September 2011	164	26	13.68%
October 2011	239	49	17.01%
November 2011	67	46	40.71%
December 2011	129	10	7.19%
January 2012	131	15	10.27%
February 2012	210	44	17.32%
March 2012	202	27	11.79%
April 2012	78	101	56.42%
May 2012	121	13	9.70%
June 2012	59	14	19.18%
July 2012	75	10	11.76%
August 2012	68	36	34.62%
September 2012	77	42	35.29%
October 2012	55	24	30.38%
November 2012	63	47	42.73%
December 2012	92	68	42.50%
January 2013	94	27	22.31%

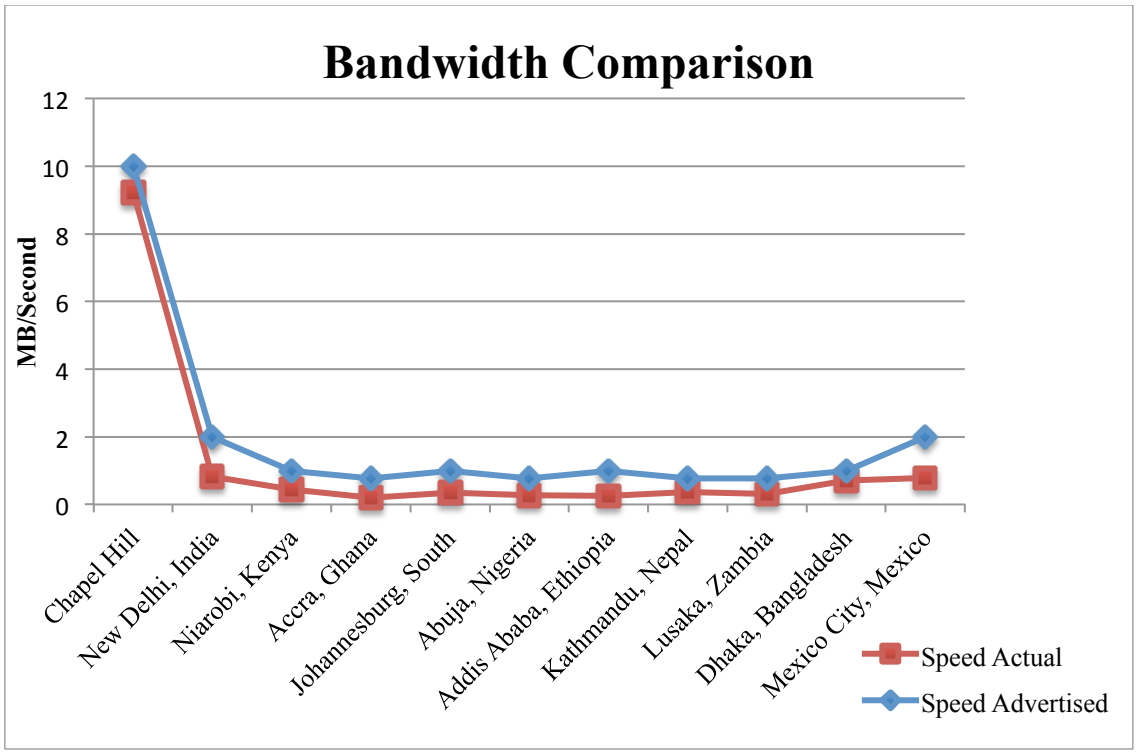
APPENDIX C: LIBRARY WEBSITE USE

Month, Year	**Portal Use**
July 2010	68
August 2010	67
September 2010	92
October 2010	71
November 2010	51
December 2010	48
January 2011	78
February 2011	85
March 2011	94
April 2011	68
May 2011	77
June 2011	100
July 2011	80
August 2011	79
September 2011	NULL
October 2011*	196
November 2011	387
December 2011	313
January 2012	360
February 2012	260
March 2012	287
April 2012	NULL
May 2012	NULL
June 2012	NULL
July 2012	NULL
August 12	NULL
September 2012	92
October 2012	96
November 2012	96
December 2012	86
January 2013	97

*Library statistics on website (portal) use appear to be a mixed group of statistics comprising the number of unique users in a month in some cases and the number of website hits totals in other cases; since Ipas has around 350 employees total, it stands to reason that the numbers for the period October 2011-March 2012 are probably not accurate measures of the number of unique users, unless every employee accessed the library portal each month of that time period, along with consultants and temporary employees for those months when over 350 users are recorded.

APPENDIX D: BANDWIDTH (PURCHASED AND ACTUAL)

Office Location	Speed Advertised by ISP (in MB/sec)	Speed Actual
Chapel Hill	10 MB	9.22 MB
New Delhi, India	2 MB	0.82 MB
Niarobi, Kenya	1 MB	0.45 MB
Accra, Ghana	.77MB	0.20 MB
Johannesburg, South Africa	1MB	0.35 MB
Abuja, Nigeria	.77MB	0.27 MB
Addis Ababa, Ethiopia	1MB	0.26 MB
Kathmandu, Nepal	.77MB	0.36 MB
Lusaka, Zambia	.77MB	0.31 MB
Dhaka, Bangladesh	1MB	0.70 MB
Mexico City, Mexico	2MB	0.79MB



APPENDIX E: SURVEY QUESTIONS

Library usage

Q1 How long have you worked for Ipas?
- ❍ 1-3 years (1)
- ❍ 3-5 years (2)
- ❍ 5 or more years (3)

Q2 In which region do you work?
- ❍ Africa (1)
- ❍ Asia (2)
- ❍ Latin American and the Caribbean (3)

Q3 What is/are the primary language(s) spoken in your office and/or region? (if more than one, please list all)

Q4 Have you been to the Chapel Hill office?
- ❍ Yes (1)
- ❍ No (2)

Q5 What kinds of information do you use for your work? (check all that apply)
- ❑ Journal articles (1)
- ❑ Books (2)
- ❑ Data sets (3)
- ❑ Government Publications (4)
- ❑ Teaching materials / curricula (5)
- ❑ Other (please specify) (6) _____

Q6 Where do you find information for your work? (check all that apply)
- ❑ Luna (1)
- ❑ On-line databases (2)
- ❑ On-line search engines (e.g. Google) (3)
- ❑ Local libraries (4)
- ❑ University libraries (5)
- ❑ Ipas Library Catalog (6)

Q7 In the past three months, how often have you consulted the following information sources for work?

	Never (1)	Less than Once a Month (2)	Once a Month (3)	2-3 Times a Month (4)	Once a Week (5)	2-3 Times a Week (6)	Daily (7)
Personal resources (books, journals, documents you own) (1)	❍	❍	❍	❍	❍	❍	❍
Office resources (books, journals, documents in the office where you work) (2)	❍	❍	❍	❍	❍	❍	❍
Colleagues (through face-to-face consultation, telephone contact, or email) (3)	❍	❍	❍	❍	❍	❍	❍
Libraries (please specify which library) (4)	❍	❍	❍	❍	❍	❍	❍

Q8 What on-line services do you use to access research articles? (check all that apply)

- ❑ PubMed or MEDLine (1)
- ❑ CINAHL (2)
- ❑ Google (3)
- ❑ Google Scholar (4)
- ❑ Embase (5)
- ❑ HINARI (6)
- ❑ POPLINE (7)
- ❑ Other (Please specify) (8) _____

Q9 In the past six months, how often have you used Ipas Library resources?
- ❍ Never (1)
- ❍ Less than Once a Month (2)
- ❍ Once a Month (3)
- ❍ 2-3 Times a Month (4)
- ❍ Once a Week (5)
- ❍ 2-3 Times a Week (6)
- ❍ Daily (7)

Q10 Which Ipas Library services or resources do you use? (check all that apply)
- ❑ Current Awareness Newsletters (1)
- ❑ Brownbag Repository (2)
- ❑ Library Catalog (3)
- ❑ On-line journal access provided by the Ipas Library (4)
- ❑ Standards and Guidelines tool (5)
- ❑ Topic Nuggets (6)
- ❑ Other (7) _____

Q11 Do you ever experience problems accessing Ipas Library resources?
- ❍ Yes (Please describe) (1) _____
- ❍ No (2)

Q12 Do you experience problems accessing and using Luna from your office?
- ❍ Yes (please describe) (1) _____
- ❍ No (2)

Q13 How reliable is your Internet connection?
- ❍ Poor (1)
- ❍ Fair (2)
- ❍ Good (3)
- ❍ Very Good (4)
- ❍ Excellent (5)

Q14 How often do you experience electricity loss?
- ❍ Never (1)
- ❍ Less than Once a Month (2)
- ❍ Once a Month (3)
- ❍ 2-3 Times a Month (4)
- ❍ Once a Week (5)
- ❍ 2-3 Times a Week (6)
- ❍ Daily (7)

Q15 Do you need resources in other languages?
- ❍ Yes (1)
- ❍ No (2)

Answer If Do you need resources in other languages? Yes Is Selected
Q16 Which languages?

Answer If Do you need resources in other languages? Yes Is Selected
Q17 Do you need resources in other languages primarily for:
- ❍ Research (1)
- ❍ Training (2)
- ❍ Handouts (3)

Q18 Have you received training on how to use library resources and services?
- ❍ Yes (1)
- ❍ No (2)

Q19 What training on Ipas Library resources and services would you like?

Q20 Please use this space to leave any other comments or suggestions for the Ipas Library

APPENDIX F: SURVEY RESULTS

1. How long have you worked for Ipas? (n=21)

Answer		Response	%
1-3 years		10	48%
3-5 years		2	10%
5 or more years		9	43%
Total		21	100%

*Approximately 58% of respondents have been employed by Ipas for fewer than 5 years, yet 62% of respondents report receiving no training on the Ipas Library's resources and services (see question 18)

2. In which region do you work? (n=21)

Answer		Response	%
Africa		12	57%
Asia		4	19%
Latin American and the Caribbean		5	24%

3. What is/are the primary language(s) spoken in your office and/or region? (if more than one, please list all) (n=21)

Text Response
English (15)
Spanish (4)
Urdu (2)
Kiswahili/Swahili (2)
Ibo
Bangla
Nepali
Bemba
Hindi
Amharic
Njanja
Zulu
SeSotho

*The responses have been grouped into the languages reported; many of the respondents reporting languages other than English as spoken in their office or region also reported English as being spoken in their office.

4. Have you been to the Chapel Hill office? (n=21)

Answer		Response	%
Yes		14	67%
No		7	33%

5. What kinds of information do you use for your work? (check all that apply) (n=21)

Answer		Response	%
Journal articles		19	90%
Teaching materials / curricula		17	81%
Government Publications		14	67%
Books		13	62%
Data sets		12	57%
Other (please specify)		3	14%

Other (please specify)
EDMats
Internet browsing
WHO publications

6. Where do you find information for your work? (check all that apply) (n=21)

Answer		Response	%
Luna		19	90%
On-line search engines (e.g. Google)		19	90%
Ipas Library Catalog		16	76%
On-line databases		13	62%
University libraries		7	33%
Local libraries		4	19%

7. In the past three months, how often have you consulted the following information sources for work?

Question	Never	Less than Once a Month	Once a Month	2-3 Times a Month	Once a Week	2-3 Times a Week	Daily	Frequency during a week (2 times per week or more)
Colleagues (through face-to-face consultation, telephone contact, or email) (n=21)	0	3	1	1	3	4	9	13
Personal resources (books, journals, documents you own) (n=20)	0	4	2	6	1	5	2	7
Office resources (books, journals, documents in the office where you work) (n=20)	0	4	3	6	4	3	0	3
Libraries (please specify which library) (n=17)	4	5	4	3	1	0	0	0

Libraries (please specify which library)
Ipas library (4)
AMREF - Online
Online

*The infrequency of library use is notable, with 9 respondents using libraries once a month or less, and 4 respondents never using libraries in the past six months. By contrast, 13 of the 21 respondents reporting collegial information sharing consult with colleagues on a daily basis or several times per week.

8. What on-line services do you use to access research articles? (check all that apply) (n=20)

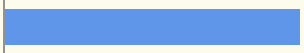
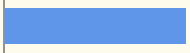
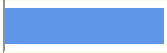
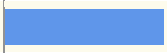
Answer	Response	%
Google	17	85%
PubMed or MEDLine	12	60%
Google Scholar	7	35%
POPLINE	6	30%
HINARI	2	10%
Other (Please specify)	1	5%
CINAHL	0	0%
Embase	0	0%

Other (Please specify)
Luna

9. In the past six months, how often have you used Ipas Library resources? (n=21)

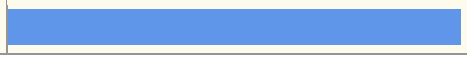
Answer	Response	%
Never	2	10%
Less than Once a Month	9	43%
Once a Month	4	19%
2-3 Times a Month	1	5%
Once a Week	1	5%
2-3 Times a Week	2	10%
Daily	2	10%

10. Which Ipas Library services or resources do you use? (check all that apply) (n=21)

Answer		Response	%
Standards and Guidelines tool		13	62%
Current Awareness Newsletters		8	38%
On-line journal access provided by the Ipas Library		8	38%
Brownbag Repository		7	33%
Library Catalog		7	33%
Topic Nuggets		4	19%
Other		2	10%

Other
I generally ask by mail for articles that some people from the Mexico office need
I mostly request Ipas Library

11. Do you ever experience problems accessing Ipas Library resources? (n=21)

Answer		Response	%
Yes (Please describe)		3	14%
No		18	86%

Yes (Please describe)
Am mostly in the field, most of the time, Luna is inaccessible there
Sometimes cannot have access videos
Sometimes, searches using AND or + don't work the same

12. Do you experience problems accessing and using Luna from your office? (n=21)

Answer	Response	%
Yes (please describe)	1	5%
No	20	95%

Yes (please describe)
poor internet connectivity

13. How reliable is your Internet connection? (n=21)

Answer	Response	%
Poor	0	0%
Fair	8	38%
Good	7	33%
Very Good	5	24%
Excellent	1	5%

*71% of respondents report that their Internet connection is fair or good. Looking at the bandwidth for country offices (Appendix D), it is reasonable to assume that perception of bandwidth is a relative measure, with the reliability of the Internet connection in the offices being considerably better than the reliability of Internet connections elsewhere in the cities or areas where Ipas staff works.

14. How often do you experience electricity loss? (n=21)

Answer		Response	%
Never		2	10%
Less than Once a Month		7	33%
Once a Month		3	14%
2-3 Times a Month		1	5%
Once a Week		1	5%
2-3 Times a Week		5	24%
Daily		2	10%

15. Do you need resources in other languages? (n=21)

Answer		Response	%
Yes		5	24%
No		16	76%
Total		21	100%

16. Which languages? (n=5)

Text Response
Español
Nepali
English (2)
French

17. Do you need resources in other languages primarily for: (n=5)

#	Answer		Response	%
2	Training		3	60%
1	Research		2	40%
3	Handouts		0	0%

18. Have you received training on how to use library resources and services? (n=21)

Answer		Response	%
Yes		8	38%
No		13	62%
Total		21	100%

19. What training on Ipas Library resources and services would you like? (n=14)

Text Response
How to access/use the different entities in Ipas Library with application to our work in the different departments
Me gustaría una capacitación general
Know how to find information quickly
How to use Library Resources and any other that will enhance my ability to offer quality service
For new staff, maneuvering on Luna is difficult. Let there be in-country teams to orient new staff on it.
If there are other new things you have introduced in the program, it will be helpful to know about it.
During IT training, I learned little about the Ipas library.
- Proper and systematic use of library resources - Management of in country library resources
How to download videos on training material
All training related to finding related reproductive health journal.
Journal Searching
Guidelines, work-related recent publications, abstracts
Online training
How quickly to access or locate documents.

20. Please use this space to leave any other comments or suggestions for the Ipas Library (n=9)

Text Response
Honestly I only look for Ipas publications in Luna and it is much better organized than in the website. I've just realized by this survey that I could also look for articles. Whenever we ask for articles or information from the library you are very efficient and answer very fast. Thanks and Congratulations!
Any time I need articles on a specific topic I always get help by one of the library colleagues doing a search for me and putting the materials together.
I want to Thank Ipas Library for their eagerness to help us achieve our personal improvement and organizational goals. Giving us the newest and latest news and relevant articles. Please keep it up. Thanks for always being there.
Luna is a very good tool but without orientation new staff are left out. Finding anything is an uphill task
Is there any training particularly on Ipas library? If yes, I am interested to get the training.
Much appreciate the efficiency of our library services, If I need something, I always find it in there. The publications alerts are helpful, prompting us which articles to read or refer to
Is it possible to make it more user-friendly? Expectation is always dynamic; We always want more than what we have today
No comments
Please provide update or tips once a quarter